DRAFT, Version 1.1

Draft Management Recommendations for Striped foldedleaf *Diplophyllum albicans* (L.) Dumortier

Version 1.1
November 4, 1996

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EXECUTIVE SUMMARY

Species: *Diplophyllum albicans* (L.) Dumortier (Striped foldedleaf or Common fold-leaf liverwort)

Taxonomic Group: Bryophyte: liverwort

ROD Components: 1, 3

Other Management Status: none

Range: *Diplophyllum albicans* is a known from coastal areas in Oregon northward through Alaska. Within our range, this species has been documented from Clatsop, Coos, Lane, Lincoln, Multnomah, and Tillamook counties in Oregon and Clallam, Cowlitz, Grays Harbor, Jefferson, Skamania, Snohomish, and Whatcom counties in Washington**.**

Specific Habitat: *Diplophyllum albicans* is found on lower tree trunks (especially western hemlock, Douglas-fir, and Sitka spruce along coast), rotten wood and humic soil and on seepy rock surfaces. It is found on moist, shaded noncalcareous rocks, and occasionally on loam covered slopes. It very rarely is an aquatic. It is most common at lower elevations, but has been reported at elevations up to 1765 m (5,800 feet) within our range. This species may not be restricted to late-successional and old growth forests. It also forms large patches on road cuts in the coastal rain forest.

Threats: No specific threats have been identified.

Management Recommendations: Based on clarifications and additional information now available, this species does not appear to require site specific protection of all known sites. The following guidelines will assist in maintaining species viability.

- Maintain riparian buffers as prescribed in the ROD.
- Maintain cool, moist, shady habitats and suitable substrate (decaying logs) to provide sufficient habitat throughout the species' range.

Information Needs: Map known sites to determine distribution within existing reserves. Evaluate status and determine if sufficient protection is afforded to ensure high likelihood of viability. If so, remove this species from the Survey and Manage List through approved process cited in Record of Decision (USDA and USDI 1994, p. C-6).

I. Natural History

A. Taxonomic/Nomenclatural History

Diplophyllum albicans (L.) Dumortier was originally described by Linneaus as *Jungermannia albicans* L. in 1753. Additional synonyms are provided below. It is currently classified in the division Hepatophyta, order Jungermanniales, and family Scapaniaceae (Stotler and Crandall-Stotler 1977).

Synonymy:

Diplophyllum albicans (L.) Dumortier Rec.d'Obs., p.16, 1835.
Jungermannia albicans L.., Spec. Pl. p.1133, 1753.
Jungermannia falcata Raddi, Jungerm. Etrusca, p. 33, 1818.
Jumgermannia fissidentoidea Huben., Hep. Germ., p. 258, 1834.
Diplophyllum albicans Dumort. (as *D. albicas*), Rec. d'Obs., p. 16, 1835; K. Muller, Rabenh. Krypt.-Fl. 6(2):355, figs. 104-105, 1914; Macvicar, Studs. Hdb. Brit. Hep. ed. 2:358, 1926; Buch, Soc. Sci. Fennica, Comm. Biol. 3(1):21, fig. 3, 1928; Anakawa & Hattori, Jour. Hattori Bot. Lab. no. 14:75, fig. 17:1-11, 1955.
Diplophylleia albicans Trev., Mem. R. Ist. Lomb., Ser. 4:420, 1877.

B. Species Description

1. Morphology (Frye and Clark 1946:585, Schuster 1974, Pojar and MacKinnon 1994:442, Vitt et al. 1988:150, Christy and Wagner 1996)

Plants of *Diplophyllum albicans* are 1-5 cm long, forming either dense mats with ascending branches or occurring as creeping plants. They are variable in color, from dark green to reddish or dark-brown. The leaves are 1.0-1.6 mm long, flattened and overlapping like reversed shingles (obliquely inserted), 2-lobed and folded lengthwise with upper lobes smaller than lower lobes. Both lobes are narrowly oblong, about twice as long as broad, the upper nearly one-half the size of the lower; the margins are irregularly and minutely serrate and tips are blunt to sharp pointed. A broad median line of colorless cells (sometimes appearing whitish) is present in both lobes, for about half of the leaf. No underleaves are present. Sporophytes are ephemeral, emerging from a deeply pleated, cone-shaped tube of fused leaves. Angled, bumpy, one-celled, yellowish-green gemmae are sometimes present on leaf margins.

Distinguishing characteristics of this species are the folded two-lobed leaves with the upper one nearly one-half the size of the lower, and the colorless elongate cells in the median portion.

*Diplophyllu*m is closely related to *Scapania*. However, the combination of gemmae, the narrow lingulate leaf lobes (2 to 4 times longer than broad) and the conspicuous sheathing leaf bases separate *Diplophyllum* from *Scapania*. Although several species of *Diplophyllum* occur in the northwest, *D. albicans* is the most common and the only one with the differentiated cells in the center of the leaf. *Diplophyllum taxifolium*, a smaller species, sometimes will have a rudimentary

medial line of differentiated cells, but only at the base of the lobes, and it tends to be yellow green.

Additional characteristics useful in distinguishing these species are included in Christy and Wagner (1996).

Figure 1. Line drawing of *Diplophyllum albicans* from Sanborne (1929) (to be added). (AWAITING COPYRIGHT PERMISSION)

2. Reproductive Biology

Diplophyllum albicans is dioicous, with male and female reproductive structures (antheridia and archegonia) borne on separate plants. Like all bryophytes, it requires water for sexual reproduction. Gemmae are important in vegetative reproduction.

3. Ecology

C. Range, Known Sites

Diplophyllum albicans is a widespread and locally common species with a holarctic and suboceanic distribution. In western North America, it is a characteristic and abundant species along the Pacific Coast (from the Bering Sea to southeastern Alaska, to the Yukon, British Columbia, Washington, and Oregon). It is also found northward into the tundra. Vitt et al. (1988) report this species as common west of the Rockies, especially near the coast. In eastern North America, it is sporadically distributed and evidently uncommon except in extreme coastal areas. It is also reported from Hawaii and Europe.

In our area, this species has been documented historically from approximately 47 sites in Clatsop, Coos, Lane, Lincoln, Multnomah, and Tillamook counties in Oregon and Clallam, Cowlitz, Grays Harbor, Jefferson, Skamania, Snohomish, and Whatcom counties in Washington. Many of the known sites occur in the Coast Range and Olympic Peninsula, where precipitation is high. Over half of the known sites occur in National Parks or other areas where management activities would be restricted.

Figure 2. Map of *Diplophyllum albicans* (to be added).

D. Habitat Characteristics and Species Abundance

Diplophyllum albicans occurs on a wide variety of moist, shaded substrates, including bark on lower tree trunks, decayed wood, sheltered cliff crevices, seepy noncalcareous rock surfaces, and loamy, humic soil. It very rarely is aquatic. It is found on western hemlock, Douglas-fir, and Sitka spruce along the coast. It occurs at elevations ranging from 30 to 1765 m (100 to

5800 feet), but is most common at lower elevations. This species is reported to be abundant in forested regions. It may not be restricted to late-successional and old-growth forests.

Schuster (1974) describes this species outside of North America, where in some locations it is reportedly the most common liverwort.

II. Current Species Situation

A. Why Species is Listed under Survey and Manage Standards and Guidelines

Diplophyllum albicans was not rated by the Bryophyte viability panel convened by the Forest Ecosystem Management Assessment Team (FEMAT), apparently due to insufficient information. It was described as most common in the Coast Range in the Sitka spruce zone and infrequent outside of the coastal strip (Bryophyte panel notes, June 1993). Based on the information available at the time, the species met the criteria for being closely associated with late-successional and old-growth forests (FEMAT 1993). It was included in the additional species analysis as a representative of the rotting wood habitats that are important to a community of cryptogamic (spore-bearing) species. Additional information now suggests that it may be sufficiently common to not require site-specific protection.

B. Major Habitat and Viability Considerations

Wagner (pers. comm.) indicates that this species is quite successful in any low elevation forest where conifers occur and high humidity maintained.

C. Threats to the Species

Diplophyllum albicans does not appear to be immediately threatened and will likely persist in shady, cool, moist habitats.

D. Distribution Relative to Land Allocations

Analysis in progress.

III. Management Goals and Objectives

A. Management Goals for the Taxon

The goal for the management of *Diplophyllum albicans* is to assist in maintaining species viability.

B. Specific Objectives

- Maintain microclimate conditions suitable for *Diplophyllum albicans* at most known sites sufficient to maintain populations that are well distributed throughout the species' range and in locations suitable to colonize other stands at appropriate seral stages.

IV. Habitat Management

A. Lessons from History

There is a considerable literature on the decline of bryophytes in Europe. Rapid decreases and fragmentation of primeval forests have caused a serious threat to bryophytes that grow on decaying wood (Laaka 1992). In addition, air pollution (particularly sulphur compounds in combination with low pH) and acid rain are implicated in declines of bryophytes (Hallingbäck 1992, Rao 1982). The extinction rate and rates of decline are high in areas where trends are documented (Greven 1992, Hallingbäck 1992). Factors associated with some logging practices that cause declines in bryophytes include the temperature extremes and the drying effect of increased wind, the lowering of surface water, and drying of logs, reduction in amount of coarse woody debris substrate, increased dispersal distance between fragments of primeval forest (Laaka 1992).

B. Identification of Habitat Areas for Management

If there are several known sites within a small geographic area, e.g., fifth field watershed, manage those which have the highest likelihood for survival and expansion.

C. Management within Habitat Areas

- Maintain riparian buffers as prescribed in ROD.
- Maintain cool, moist, shady habitats and suitable substrate (decaying logs) to provide sufficient habitat throughout the species' range.

D. Other Management Issues and Considerations

While *Diplophyllum albicans* does not appear to be a rare species requiring intensive management at this time, it will be valuable to monitor a wide variety of bryophytes to ensure that management practices do not result in declines and extirpations in the Pacific Northwest. Because this species is broadly distributed and sufficiently abundant to permit collection of samples for analysis, it may be an appropriate species to consider for air quality monitoring.

V. Research, Inventory and Monitoring Needs

A. Data Gaps and Information Needs

While additional information would be valuable to collect for this species, it is not considered a priority at this time.

B. Research Questions

Determining the response of bryophytes to various management treatments will be important for adaptive management. Specifically, how effective is clumped leave tree retention in providing habitat continuity for bryophytes? The potential use of bryophytes as indicators of microclimate changes caused by forest management actions should be explored. Successional studies of coarse woody debris within managed and unmanaged stands could help define environmental conditions required for establishment of rotten-wood inhabiting bryophytes.

C. Monitoring Needs and Recommendations

No monitoring recommended at this time.

VI. References

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